CS 421 --- PROLOG Activity

<table>
<thead>
<tr>
<th>Manager</th>
<th>Keeps team on track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorder</td>
<td>Records decisions</td>
</tr>
<tr>
<td>Reporter</td>
<td>Reports to class</td>
</tr>
<tr>
<td>Reflector</td>
<td>Assesses team performance</td>
</tr>
</tbody>
</table>

**Introduction**

Consider the following PROLOG program that describes a directed graph with edge weights.

```
1 connected(a,b,8).
2 connected(a,c,6).
3 connected(a,d,7).
4 connected(b,e,5).
5 connected(c,g,3).
6 connected(c,h,9).
7 connected(d,h,8).
8 connected(g,h,2).
9 connected(e,k,3).
10 connected(g,k,5).
11 connected(h,k,7).
```

**Problem 1)** Have the recorder draw a picture of the graph represented by the above program.

**Problem 2)** Consider now this stupid PROLOG session. The -? is the prompt for the REPL.

```
1 -? connected(a,b,8).
2 true.
3 -? connected(a,b,C).
4 C = 8.
5 -? connected(a,g,C).
6 false.
7 -? not(connected(a,g,C)).
8 true.
9 -? connected(a,X,C).
10 X = b, C = 8 ;
11 X = c, C = 6 ;
12 X = d, C = 7 .
13 -? connected(c,X,_) , connected(X,k,_).
14 X = h .
```
**Instructions:**
Manager and reporter form one group, everyone else form a second group. Each group should walk through this code and decide what is happening, and then answer the following questions. When both groups are done, reconvene and check that everyone agrees. If you are unsure of a question, make a hypothesis to share with the group.

**Problem 3)** What would happen if we typed in connected(a,b,9)?

**Problem 4)** What is the role of C and X in this code?

**Problem 5)** What is the role of _ in this code?
Paths

Consider this PROLOG code:

1. `sumList([],0).
2. sumList([H|T],C) :- sumList(T,C2), C is H + C2.
3. sumList([],0).
4. sumList2([H|T],C) :- sumList2(T,C2), C = H + C2.
5. pathFrom(A,B,[A,B],1) :- connected(A,B,\_).
6. pathFrom(A,B,[A|T],C) :- connected(A,Z,\_), pathFrom(Z,B,T,C2), C is 1 + C2.

Here are some sample queries.

1. `-? sumList([2,4,6],P).
2. P = 12 .
3. `-? sumList([2],P).
4. P = 2 .
5. `-? sumList2([2,3,4],C).
6. C = 2+(3+(4+0)).
7. `-? pathFrom(a,h,P,C).
8. P = [a,c,h]
9. C = 2 ;
10. P = [a,d,h]
12. `-? pathFrom(b,h,P,C).
13. false.

**Problem 6)** Explain the syntax `[H|T]` What are the values of H and T in the above calls to sumList?

**Problem 7)** What is the difference between = and is?

**Problem 8)** We want to change pathFrom so that C contains the sum of the edge weights. How should we change pathFrom to make that happen?
Treasure!

There is a treasure chest in room $g$, and keys that fit the chest in rooms $e$ and $h$.

**Problem 9)** Make some new predicates to represent this new information.

**Problem 10)** Write predicates `foundChest(P)` and `foundKey(P)` that succeed when path $P$ has a room containing a chest or a key, respectively.

**Problem 11)** Write a predicate `gotTreasure(P)` that succeeds when given a path that has both a key and a chest. But wait! The graph is directed. It doesn't count if the key comes after the chest.
Manager or Reflector: Consider the objectives of this activity and your team's experience with it, and then answer the following questions after consulting with your team.

1. What was a strength of this activity? List one aspect that helped it achieve its purpose.

2. What is one thing we could do to improve this activity to make it more effective?

3. What insights did you have about the activity, either the content or at the meta level?
## PROLOG Activity--- Reflector's Report

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>Keeps team on track</td>
</tr>
<tr>
<td>Recorder</td>
<td>Records decisions</td>
</tr>
<tr>
<td>Reporter</td>
<td>Reports to Class</td>
</tr>
<tr>
<td>Reflector</td>
<td>Assesses team performance</td>
</tr>
</tbody>
</table>

1. What was a strength of your team's performance for this activity?

2. What could you do next time to increase your team's performance?

3. What insights did you have about the activity or your team's interaction today?